2. Methodology

2.1 GENERAL APPROACH

Information on the composition, extent and ecological values of indigenous natural areas within 13[1] ecological districts in Northland was gathered during rapid reconnaissance surveys using semi-quantitative methods between 1994 and 1997. Survey work on a further five[2] ecological districts was started after 1997.

The majority of information on the Tokatoka Ecological District was collected during reconnaissance surveys using rapid semi-quantitative methods between March 1998 and December 1999. Field work was conducted by a DOC employee and coordinated in the Whangarei Office of DOC's Northland Conservancy. During 2009/10, the Tokatoka Ecological District report was prepared for publication with information about new sites added, along with information collected during a few site revisits.

Natural areas were identified from topographic maps, aerial photography (orthophotography flown in 2002 and 2008), existing databases, published and unpublished reports and field observations. Areas were identified and surveyed without regard for land tenure. This meant that most areas were surveyed using the same methodology, which provided a consistent approach to determining representativeness of unprotected natural areas.

Each site recorded was mapped, allocated a generic number and described. Following evaluation (see criterion 2.4 below), sites were grouped according to one of two levels of ecological significance: Level 1 or 2. Scientific names of species for which common names only have been used can be found in Appendix 8 (for common fauna names used in the text) or Appendix 6 (for common plant names used in the text).

Extensive use was made of information from existing biological databases and information systems such as the Sites of Special Biological Interest (SSBI), the Bioweb Threatened Plants Database, the Herptofauna Database, the NIWA Freshwater Fish Database and published information and DOC internal files and reports. Herbarium records from Auckland Institute and Museum were also consulted. Geographical and geological information was gained from existing published and unpublished maps.

Although most sites were not surveyed in detail, a large amount of information was collected, considerably expanding the ecological information base for the Ecological District. It is important to note that, as with any large-scale survey, it is possible that some significant natural areas and features have been overlooked.

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[1] Northland contains 19 mainland Ecological Districts: Te Paki, Aupouri, Maungataniwha, Ahipara, Whangaroa, Hokianga, Puketi, Kerikeri, Kaikohe, Tutamoe, Tangihua, Whangaruru, Whangarei, Otamatea (part), Rodney (part) (Rodney ED was one of the first PNAP surveys to be conducted in the country with work carried out in 1983/84), Waipu, Kaipara (part), Tokatoka, and Manaia. The first 13 were surveyed/or survey was started by Northland Conservancy between 1994 and 1997. To date, Northland Conservancy has published 18 PNAP reports.

[2] The Ecological Districts are Manaia, Tokatoka, Otamatea (part), Waipu, and Kaipara (part). Rodney (part) is currently being re-surveyed using the methodology outlined in this report.

2.2 CONSULTATION WITH LANDOWNERS

Personal contact with all landowners was not possible because of the magnitude and geographic range of the surveys being undertaken. All ratepayers within the Whangarei District Council area were sent a leaflet by mail (Appendix 2) informing them of the PNA Programme and the reason for it. The leaflet was signed by the then Regional Conservator of DOC's, Northland Conservancy, and provided contacts for further information. Consultation in the remaining area of the Tokatoka Ecological District (the part within the Kaipara District Council area) involved five hall meetings with landowners, DOC staff, and the Kaipara District Council members. During the PNAP survey in the Kaipara District Council area in 1998–1999, leaflets (signed by the Conservator of Northland Conservancy and the General Manager of Kaipara District Council) were supplied to interested people encountered along the way (Appendix 2).

If needed, permission for access was sought from landowners either by telephone or by direct visit. Permission was generally given.

Ngati whatua were consulted by the Protection Manager and the Senior Conservation Officer, Habitat Protection, from Northland Conservancy, when the PNAP was first initiated in Northland between 1994-97.

2.3 DATA ACQUISITION AND ANALYSIS

A rapid reconnaissance field survey was carried out to record and map ecological and geomorphological characteristics, broad habitat type and canopy vegetation of each identified natural area. Most of this work was carried out using telescopes and binoculars from roads or nearby high points.

Some sites were not sighted or surveyed in full, because of lack of clear visibility from a road and/or failure to obtain landowner permission for access. As a result, information on some of these sites remains limited, and it is likely that some species associations have not been recorded.

In this report, natural areas were mapped using three broad categories of habitat types: forest, shrubland, wetland (see Appendix 9 for glossary of terms).

At each site, the composition and relative abundance of canopy plant species was recorded on the field survey sheet (see Appendix 1) in the following four categories: greater than 50% cover was defined as 'abundant'; 20–50% cover as 'common'; 5–20% cover as 'uncommon' or 'frequent'; and less than 5% cover as 'rare' or 'occasional'.

Species present in the 'abundant' and/or 'common' columns of the survey sheets were used to define each ecological unit.

Canopy composition based on percentage cover abundance is widely considered to be a valuable approach for description of forest stands. This technique, as well as variations of the technique, have been used to describe canopy composition in New Zealand (see Atkinson 1962, 1985; Park & Walls

1978; Leathwick & Rogers 1996) and in other parts of the world (see Mueller-Dombois & Ellenberg 1974; Kershaw & Looney 1985). The specific technique for vegetation description at each site is based on the approach set out in Myers et al. (1987).

This semi-quantitative method was favored because of the time constraints for the field survey, the extensive areas to be covered and because it could be applied to all vegetation types, with ground cover plant species or substrate being recorded in non-forest habitats. More detailed, and therefore more time-consuming and expensive methods, would not necessarily provide more useful information for assessing representativeness.

The disadvantage of the semi-quantitative survey approach applied is that it did not provide a great deal of information on the distribution of uncommon or threatened canopy and understorey species.

Landform/geological information was compiled by Dr. Fred Brook. Some sites had only one vegetation type on one landform/geological unit, while others had multiples of each. Sorting of these ecological units gave information on their frequency and extent in the study area. This information was used to determine the representativeness of each ecological unit (Table 6, p. 420).

Other relevant information collected incidentally, such as fauna observations, threats and details obtained from landowners was also recorded on the survey sheet for each site.

Once the field reconnaissance or survey had been completed, sites were numbered, and information from other information systems and databases, e.g. SSBI and threatened species information, was added to the report forms. Completed survey forms are held by DOC, Northland Conservancy Office, Whangarei.

2.4 CRITERIA FOR ASSESSMENT OF HABITAT SIGNIFICANCE

To be included in this report, natural areas had to meet at least one of the following criteria:

- They are of predominantly indigenous character, by virtue of physical dominance, species composition etc.
- They provide habitat for a Threatened, At Risk or Regionally significant indigenous plant or animal species
- They include an indigenous vegetation community or ecological unit, in any condition, that is nationally uncommon or much reduced from its former extent.

The conservation values of these areas were then assessed using a two-level classification of habitat significance based on the PNAP ecological criteria of representativeness, rarity and special features, diversity and pattern, habitat structure and characteristics important for the maintenance of ecosystems (buffer, linkage or corridor, size and shape) (see Table 7, p. 433).

The PNAP criterion of long-term viability has not been included in Table 7. Long-term viability was considered under the umbrella of representativeness, diversity and pattern, naturalness, size and shape. Table 1 outlines the links between PNAP criteria and the Level 1 and 2 criteria.

2.4.1 Level 1 sites

Level 1 sites contain significant vegetation and/or significant habitats of indigenous fauna and are defined by the presence of one or more of the following ecological characteristics:

1. Contain or is regularly used by critical, endangered, vulnerable, declining, recovering or naturally uncommon taxa (i.e. species and subspecies), or taxa of indeterminate threatened status nationally
2. Contain or is regularly used by indigenous or endemic taxa that are threatened, rare, or of local occurrence in Northland or in the Ecological District
3. Contain the best representative examples in the ecological district of a particular ecological unit or combination of ecological units
4. Have a high diversity of taxa or habitat types for the ecological district.
5. Ecological buffers, linkages or corridors to other areas of significant vegetation or significant habitats of indigenous fauna
6. Contain habitat types that are rare or threatened in the ecological district or regionally or nationally
7. Support good populations of taxa which are endemic to Northland or Northland-Auckland
8. Important for indigenous or endemic migratory taxa
9. Cover a large geographic area relative to other similar habitat types within the Ecological District

Level 2 sites support populations of indigenous flora and fauna not identified as meeting the criteria for level 1. Level 2 sites may:

- Contain common indigenous species
- Be small and isolated from other habitats
- Contain a high proportion of pest species
- Be structurally modified e.g. forest understorey grazed
- Have not been surveyed sufficiently to determine whether they meet the criteria for level 1 sites

Table 1 describes the links between PNAP criteria and Levels 1 and 2.

2.5 UPDATING OF DATA

Natural ecosystems and habitats are dynamic and are forever changing, both physically and biologically. Some areas are more dynamic than others e.g. wetlands (which are particularly susceptible to changes in ground water hydrology) whilst others change more gradually, e.g. climax forest. The status and composition of species within some habitats also changes over time and this could result in changes to the value of some habitats.

TABLE 1. LINKS BETWEEN THE PNAP CRITERIA AND LEVELS 1 AND 2.

PNAP CRITERIA	LEVEL 1	LEVEL 2
Representativeness*	Contains the best representative examples in the Ecological District of a particular ecological unit or combination of ecological units (3). Supports good populations of taxa which are endemic to Northland or Northland-Auckland (7).	Not one of the best examples of its type in the Ecological District.
Rarity and special features	Contains or is regularly used by critical, endangered, vulnerable or declining or naturally uncommon taxa (i.e. species and subspecies), or taxa of indeterminate threatened status nationally (1). Contains or is regularly used by indigenous or endemic taxa that are of regional significance in Northland or in the Ecological District (2). Contains habitat types that are rare or threatened in the Ecological District or regionally or nationally (6). Is important for endemic and indigenous migratory taxa (8).	Does not regularly contain, or there is no currently known threatened or regionally significant species, contains common habitat types. No currently known special features.
Diversity and pattern	Has a high diversity of taxa or habitat types for the Ecological District (4).	May contain only one habitat type and/or have a low diversity of taxa relative to other areas of a similar type.
Naturalness	Exhibits a higher level of naturalness than other examples of its type in the Ecological District.	Exhibits a lower level of naturalness than other examples of its type in the Ecological District.
Buffering/corridors and linkages	Forms ecological buffers, linkages or corridors to other areas of significant vegetation or significant habitats of indigenous fauna (5).	May be heavily impacted by external influences or may be fragmented and isolated from other natural areas.
Size and shape	Covers a large geographic area relative to other similar habitat types within the Ecological District (9).	Is likely to be small relative to other similar examples of its type, or if large, is not the best example of its type and meets no other criteria for a Level 1 site.
Long-term ecological viability	If the long-term viability of the site is high or medium, it is likely to meet one or more of the other criteria above, or if low, may nevertheless be the best or only example of its type in the Ecological District.	May require a high degree of management to achieve viability or may never be viable under present circumstances or, if viable, may not meet any other criteria for a Level 1 site.

* Best representative examples include sites with the highest level of naturalness, diversity, in the best condition, and with values other than ecological values such as cultural and amenity values (where known).

Human-induced activities and changes, both within or adjoining significant natural areas, can rapidly speed up the processes of change. Fire, followed by adventive weeds, can dramatically modify shrublands. Drainage of adjoining land can alter the water tables of wetlands, thus lowering the quality of the habitat and facilitating the establishment of weeds. Ongoing piecemeal destruction or modification of habitats and sustained grazing of bush remnants will, in the long term, completely eliminate some habitats.

The natural areas identified in this survey will require regular monitoring to note changes in both species and habitat composition and condition, and continued assessment of their ecological significance. Over time, it is possible that Level 2 sites may qualify as Level 1 sites, or that Level 1 sites could lose their higher level of significance.